

**INDICATIONS, METHODS AND OUTCOME OF INDUCTION OF  
LABOR AT MUHIMBILI NATIONAL HOSPITAL,  
DAR ES SALAAM, TANZANIA**

**Shweta Jaiswal, MD**

**Master of Medicine (Obstetrics and Gynaecology) Dissertation  
Muhimbili University of Health and Allied Sciences  
October, 2015**

**INDICATIONS ,METHODS AND OUTCOME OF INDUCTION OF LABOR  
AT MUHIMBILI NATIONAL HOSPITAL, DAR ES SALAAM, TANZANIA**

**By**

**Shweta Jaiswal, MD**

**A Dissertation Submitted in (Partial) Fulfillment of the Requirements for the Degree  
of Master of Medicine (Obstetrics and Gynaecology) of  
Muhimbili University of Health and Allied Sciences**

**Muhimbili University of Health and Allied Sciences  
October, 2015**

**CERTIFICATION**

The undersigned certify that he has read and hereby recommend for acceptance by the Muhimbili University of Health and Allied Sciences a dissertation entitled: *Indications , methods and outcome of induction of labour at Muhimbili National hospital, Dar es salaam*, in (partial) fulfillment of the requirements for the degree of Master of Medicine, (Obstetrics and Gynaecology) of the Muhimbili University of Health and Allied Sciences (MUHAS).

.....

**Prof. Charles Kilewo**  
(Supervisor)

Date: .....

**DECLARATION  
AND  
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I, **Shweta Jaiswal**, declare that this **dissertation** is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

**Signature** ..... **Date**.....

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## ACKNOWLEDGEMENT

Thanks to the Almighty God, by whose Grace and Mercy I have completed this work.

Grateful thanks to my supervisor, Professor Charles Kilewo for his guidance and assistance throughout the study period.

I would like to extend my special thanks to Dr. Candida for her advice on the statistical aspects of this study.

In a special way, thanks to all members of the department of Obstetrics and Gynaecology (MUHAS/MNH) for their constructive criticism that made this work better.

My gratitude also goes to all the staff of the Muhimbili National Hospital for their support, help and assistance during the study.

Heartfelt thanks to my entire classmate for their support and encouragement in doing this work and throughout my three years of study.

Special thanks to my family members Mr Bhavesh Samji, Bhavna, Dipika, my husband Dr Sunil Samji, and my father in law Mr Laxman Samji for ongoing moral support during my whole course work.

**DEDICATION**

This work is dedicated to my late grandmother and parents Mr Neel Ratan Jaiswal & Dr Shashi Prabha Jaiswal, who encouraged me to become what I am for all their hard work towards me and taught me to read and write. My sisters, Dr Nirupma, Dr Apurva, my husband Dr Sunil Laxman Samji and our lovely daughter Mahi Sunil Samji.

## ABSTRACT

**Background:** Induction of labour is the process of initiating uterine contractions before the onset of spontaneous contractions in order to achieve vaginal delivery. Induction of uterine contractions leads to progressive effacement and dilatation of the cervix and birth of the baby. This includes both women with intact membranes and women with spontaneous rupture of membrane but who are not in labour. The different methods used for Induction of labour are mechanical surgical and pharmacological. Induction of labour includes a pre induction Bishop's assessment, of which scores of seven and above indicates a favorable cervix and scores less than seven indicates an unfavorable cervix.

**Objectives:** To determine indications, methods and outcome of induction of labor at Muhimbili National Hospital.

**Methodology:** This was a hospital based retrospective descriptive study conducted from July 2014 to January 2015, at Muhimbili National Hospital, Dar-es-salaam involving 120 pregnant women. All women who meet the inclusion criteria with indications for induction of labor with gestation age 29 weeks and above were included in the study. The variables of interest included socio-demographic characteristics, obstetric history, and medical history, indication for induction of labour, maternal and neonatal outcomes. Data were collected by means of structured data collection tool. Data cleaning was followed by analysis using SPSS version 20. Demographic data and categorical variables were summarized into frequencies, means, standard deviations, proportions and cross tabulations. Data was presented in tables.

**Results:** The total number of deliveries during the period of study was 5,373 out of which total of 120 women underwent induction of labour . This gave a rate for induction of labor of 2.3%.

Mean maternal age was 28.72 (SD 5.47) years and the median gestational age was 38.76 (28-42) completed weeks. The main indications for induction of labour were postterm pregnancy 60 (50%), hypertensive disorders of pregnancy 38 (31.7%), premature rupture of membranes 21(17.5%).Out of these women, 74 (61.7%) had spontaneous vaginal delivery and 46 (38.3%) had emergency caesarean section deliveries.

The common complication observed in the mothers was failed induction of labour. The neonatal outcome constituted all live births. The neonates admitted in neonatal ward for further management were 10 (8.3%). Mean induction delivery interval was 16.00(SD 11.15) hours. The most common method used for induction of labor was pharmacological method using vaginal dinoprostone with intravenous oxytocin.

**Conclusion:** Induction of labor is safe and beneficial as there were minimal maternal and neonatal complications. Post-dated pregnancy accounted for the majority of indications for induction of labour at term at MNH.

**Recommendation:** Further studies should be done to compare the best method of induction of labour. To encourage more induction of labour together with vigilant monitoring of women during the process of induction and during labour, including a cardiotocograph.



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**LIST OF ABBREVIATIONS**

|       |   |
|-------|---|
| ACOG  | : American College of Obstetricians and Gynecologists |
| C.S   | : Caesarean section                                   |
| IOL   | : Induction of labor                                  |
| IUFD  | : Intrauterine fetal death                            |
| IUGR  | : Intra uterine growth restriction                    |
| MNH   | : Muhimbili National Hospital                         |
| MUHAS | : Muhimbili University of Health and Allied Sciences  |
| MIU   | :Milliinternational units                             |
| MLS   | :milliliter   |
| MSL   | :Meconeum stained liquor                              |
| PROM  | : Premature rupture of membranes.                     |
| PG    | : Prostaglandin                                       |
| SVD   | : Spontaneous vaginal delivery                        |

.

## DEFINITION OF TERMS

**Induction of Labor:** Induction of labor is defined as an intervention designed to artificially initiate uterine contractions leading to progressive effacement and dilatation of the cervix and the birth of the baby.

**Failed induction of labour:** It is defined as failure to establish labour after one cycle of treatment, which includes the insertion of two vaginal PGE2 tablets (3 mg) or gel (1–2 mg) at 6-hourly intervals, or one PGE2 controlled released pessary (10 mg) over 24 hours (1).

**Uterine hyper stimulation:** tachysystole or hyper systole with FHR changes such as persistent decelerations, tachycardia or decreased short term variability.

**Apgar score:** A numerical scoring system applied at 1 and 5 minutes after birth of the baby to evaluate the condition of the baby based on heart rate, appearance, grimace, and activity and respiration .Scores 7 and above are normal, 4 to 6 fairly low and 3 and below are regarded as critically low.

**Bishops score:** The assessment of the cervix in a pregnant woman to determine its inducibility based on the following components consisting of cervical dilatation, length, position and consistency of the cervix.

**Induction delivery interval:** The time from initiation of uterine contractions till delivery of the baby.

## **INTRODUCTION**

Induction of labour (IOL) is defined as artificial initiation of uterine contractions prior to its spontaneous onset at a viable gestational age with the aim of achieving vaginal delivery (2). This includes both pregnant women with intact membranes and with spontaneous rupture of membranes who have not started labour. It is a common obstetric procedure performed due to many reasons.

The important factors, that favour successful induction are multiparity, favorable cervix and gestational age (3). The cervical status is an important predictor for successful induction of labour (4). A scoring system described by Bishop in 1964, is based on cervical examination to predict vaginal delivery. The Bishop's score has five components: cervical dilatation, cervical effacement, and cervical consistency/ripening, station of the baby's head and position of the cervix. Cervical dilatation is the most important component in Bishop's score (5).

The history of labor induction dates back to Hippocrates' original descriptions of - mammary stimulation and mechanical dilation of the cervical canal. During the second century AD, procedures such as artificial rupture of membranes, manual dilatation of the cervix and strong enemas were used for induction of labour. Beginning of 2nd through the 17th centuries, mechanical methods were more in use.

In 1810, James was the first in the United States to use amniotomy for induction of labour. In 1906, Dale observed that extract of pituitary gland caused myometrial contractions. Oxytocin was discovered fifty years later, in 1953 later by a biochemist Vincent du Vigneaud. Synthetic oxytocin has been in use since 1955(6). In 1968, Karim and colleagues were the first to report the use of prostaglandins for IOL. The synthetic prostaglandin analogue misoprostol has gained acceptance as an effective and safe method of labour induction.(7)

There are different methods of IOL and the most commonly used are mechanical, pharmacological and surgical methods. Mechanical method includes the use of various

types of catheters and hygroscopic dilator's, which are introduced in the cervical canal or into the extra amniotic space. The mechanism of action is that they exert local pressure on the cervix, cause overstretching of the lower uterine segment and stimulate the production and secretion of prostaglandins. The Foley catheter provides direct pressure on the cervix as the balloon is filled with 30 mls of water, while the hygroscopic dilators absorb local tissue fluids and moisture, causing the device to expand within the cervical canal, called as lamnaria tents.

The Pharmacological methods are Prostaglandin and Oxytocin. The surgical methods consists of Stripping of membranes and Amniotomy. Prostaglandins cause cervical ripening and stimulate myometrial contraction. They increase intracellular calcium levels causing myometrial contractions. They are PGE1 , PGE2 and PGF2.

Misoprostol is PGE1 analogue, it causes ripening of the cervix and contraction of the uterus and induces labor, the routes of administration are oral, vaginal, and rectal and intracervical. Vaginal route is mostly used because peak levels are reached slowly and sustained for long time. The dose for vaginal route is 25mcg every 4 to 6 hourly for 24 hours (8). Common side effects are; nausea, vomiting, pyrexia shivering and hyper stimulation of the uterus. Misoprostol, binds to myometrial cells to cause strong myometrial contractions leading to expulsion of tissues and uterine contents .It also causes cervical ripening with softening and dilation of the cervix.

Dinoprostone PGE2 acts on the cervix by different mechanisms. It increases the activity of collagenase, hyaluronic acid and elastase causing relaxation of smooth muscles of cervix. There is an increase in intracellular calcium levels, causing contraction of myometrial muscles also. The common side effects are uterine tachysystole and hyper stimulation of uterus, nausea, vomiting, diarrhea and fever. It has two routes of administration intravaginal insertion and intracervical gel. Intracervical gel form is available in 2.5ml syringe, dose is 0.5mg every 6 hourly, with a maximum dose of 1.5mg, three doses in 24 hours. Dinoprostone 10 mg is available as vaginal insert, which releases dinoprostone at the rate of 0.3 mg per hour for 12 hours (3).

Oxytocin is an octapeptid hormone secreted from supra-ventricular and Para optic nuclei of hypothalamus; it is stored in pituitary and released in pulsatile manner. It activates phospholipase C inositol pathways and increases intracellular calcium level and stimulates myometrial contraction, has no effect on the cervix. Response depends on the gestational age, as the oxytocin receptors increase with the increase in gestation age. They are increased 200 to 300 fold at the time of onset of labour. The dose for induction of labor is 5 I.U in 500mls which is equivalent to 10mu/ml. It is administered by counting drops /min, where 15 drops are equivalent to 1ml. Titration of the infusion should begin at 10drops /min and the dosage increased every 30 min by 10 drops /min until ideal contraction is achieved(that is 3-4 contractions in every 10 minutes) each contraction lasting for 45 seconds . Adverse effects are uterine hyper stimulation, water intoxication, uterine rupture and hypotension (3).

Membrane stripping-increases the serum level of endogenous prostaglandins. It increases phospholipase A2 and PGF2a. Risks include infection, bleeding, rupture of membrane and patient discomfort (9).

Amniotomy: it is called as artificial rupture of the membranes. It increases the production of prostaglandins and causes the release of Prostaglandins. Adverse effects include umbilical cord prolapse, fetal heart rate deceleration, and bleeding, maternal and neonatal infections (9).

According to previous studies done the relationship between IOL and pregnancy outcomes are good when done in postterm pregnancies .The current status of knowledge on indications of labour, the different methods used and the mode of delivery are well known .

Induction of labor is directly relevant to the health related millennium development goals. It helps in preventing maternal complications and improving pregnancy outcome. The study into IOL and maternal and neonatal outcome at MNH was not done before .There is existing gap and this study will create valuable and useful knowledge which can be used for future planning .



## LITERATURE REVIEW

Worldwide the rate of induction of labour is different. It varies between different countries and even between different regions of the same country. The WHO Global survey on maternal and perinatal health in 24 countries showed that 9.6% of all deliveries involved induction of labour (9).

Overall, the IOL is higher in developed countries than in developing countries. In the United States of America and United Kingdom 20% of all deliveries are due to induction of labour (10). The rates of IOL are on rise in developed countries which is attributed mainly due to patient and physician factor (11). According to the WHO Global secondary survey by Fawole and colleagues induction of labor in developing countries is low 4.4% in Africa & 12.1% in Asia (12). In South Africa in regional hospital in Gauteng the rate of induction was 9.6 % (13).

Induction of labour is indicated when the benefits to mother or fetus are more than the risk of continuing the pregnancy. Induction of labour improves maternal and neonatal outcomes and is directly related to millennium development goals. The main aim of induction of labour is successful vaginal delivery as the morbidity associated with operative delivery is reduced. Induction of labour improves adverse fetal outcome which is found to be increased beyond 41 weeks of gestation age (14).

To decrease the caesarean section is an important step in low resource settings as the risks with caesarean delivery are more (12). Induction of labour lowers the caesarean deliveries, in hospitals where IOL is more practiced (15).

In a study by Ibrahim in Nigeria the rate of induction of labour was found to be 6.5%, majority of women delivered within 12 hours after induction. Reduction in time from induction to delivery is of advantage to the pregnant mothers and their family as the duration of labor decreases, it helps in reducing the congestion in the labour wards (16).

The most common indication for induction of labour worldwide is hypertensive disorders of pregnancy (17). Another important indication for induction of labour is postdate pregnancy. Postdate pregnancy as it carries risk to the neonate due to the ageing of the placenta leading to placental insufficiency with advancing gestation. Postdate pregnancy is also associated with increased birth trauma and meconium aspiration. Induction also helps in reducing perinatal deaths and still births which are associated with postdate pregnancy (18).

Postterm pregnancy and hypertensive disorders of pregnancy were the common indications in prospective study done in the Usmanu Danfodiyo University Teaching Hospital, Sokoto, where the proportion of postdate pregnancy was 45.8%. The criteria for postdatism was not mentioned and more than 50% of women had their first ultrasound scan after 27 weeks of gestation. Premature rupture of membranes 31.9%, Intra uterine fetal death 12.4%, (19). The NICE guidelines recommend induction of labour after 34 weeks in Premature rupture of membranes as there is increased risk of maternal and fetal infections due to rupture of membranes (1).

In a cross sectional prospective study done by Ibrahim et al in Nigeria the proportion of postdate pregnancies was 51.7%, premature rupture of membranes 31.7% and hypertension in pregnancy 10.0% (16). The main indications in a study at Kinshasa were hypertensive disorder 54.1%, PROM 29.5%, postdate 14.6% (20). In the study done at Kenyatta National Hospital by Marian the most common indication of labor was postdates 133 (50.0%) followed by hypertensive disorders 42 (16%), followed by premature rupture of membrane 22 (8.4%) (21).

According to guidelines developed by ACOG committee the maternal and neonatal indication of induction of labour includes conditions such as Abruption placentae, postdate pregnancy PROM. Maternal medical conditions example diabetes mellitus renal disease, chronic pulmonary disease, chronic hypertension, antiphospholipid

syndrome. Fetal indications include chorioamnionitis, intrauterine fetal death, oligohydramnios, isoimmunization, severe fetal growth restriction (10).

According to the study done in Aga Khan hospital, Pakistan which was a retrospective cross sectional study for a period of one year 18.1% had failed induction of labor and it was more common among nulliparous women who had poor Bishop's score. Induction was successful if the women delivered by SVD and failed if the women underwent caesarean section (22). The indications for caesarean section in the study done in rural population in KwaZulu-Natal Province in South Africa were Cephalopelvic disproportion was 14.9% and failed IOL 12.9% (13). Cephalopelvic disproportion was the most common indication for operative deliveries in 5 (8.3%) women undergoing induction of labor in the study done in Nigeria (16).

Failed induction of labor means that women do not enter active labour after the insertion of two vaginal PGE<sub>2</sub> tablets 10 mg at 12-hourly intervals, or one PGE<sub>2</sub> controlled released pessary (10 mg) over 24 hours (23,24). The subsequent management should be discussed with the women before the process of IOL as failed induction may need a further attempt to induce labor or a caesarean section (1).

In a retrospective study of cases in Nigerian study by Lawani most of the women (75.9%) had vaginal delivery, while 24.1% had emergency caesarean section. Of these women the mean age of the participants and mean parity was  $27.51 \pm 8.37$  years and  $3.6 \pm 1.1$  and varying level of education (17). In a retrospective descriptive cohort study which included all the women with singleton pregnancy above 37 weeks at Kinshasa at democratic republic of Congo, the maternal outcome and mode of delivery was SVD in 66.9% of women and caesarean section in 29.6% (18). The means for maternal age, gestation age and weight were  $30.5 \pm 5.7$  years,  $37.95 \pm 1.54$  weeks and  $69.3 \pm 15.1$  kg.

According to a Secondary Analysis of the WHO Global Survey on Maternal and Neonatal Health, the main maternal outcomes were delivery by caesarean section after induction of labour, maternal death, perineal laceration, blood transfusion, postpartum hospital stay for 7 days. The neonatal outcomes were APGAR score less than 7 at 5

minutes ,low birth weight, fresh still birth ,admission to neonatal wards and neonatal death occurring before the discharge of the patients (19). According to a study in Canada, at University of Toronto for the effects of induction of labor on still births ,it was observed that induction of labor was associated with reduction in stillbirth among postdate women (20).

According to retrospective a study done in Regional hospital in KwaZulu-Natal South Africa by B .Malende 59.8% of women had spontaneous vaginal delivery and 40.2 % had caesarean section. The study used retrospective hospital chart review. The women also had post-partum hemorrhage, puerperal sepsis and 6.8% of babies were admitted to neonatal wards out of which 2.0% were premature, 1.85% had hypoxic ischemic encephalopathy and there was one early neonatal death (13).The reason for poor neonatal outcome could be failure to provide good quality intrapartum care .

MNH is a tertiary hospital receiving referrals of complicated cases from the municipal hospitals and other surrounding hospitals. The hospital has a protocol for inducing pregnant women who are at risk or their fetuses are at risk if pregnancy is continued. Although this procedure has been used for many years now there are no previous studies documenting its magnitude, indications methods and outcomes of this important life saving obstetric procedure. The availability of new agents for ripening the cervix makes induction of labour much easier than ever before. From literature review this has increased the rate of induction in the developed countries while it has remained low in developing countries. On the other hand the rate of caesarean section is alarmingly high including MNH where the rate now is 2.3 .

Therefore there is need for a study which will help us to know the maternal and neonatal outcome of induction of labour in our hospital and the rate of induction. These studies have been done in different parts of the world, where the induction is known .It is important to do some studies at MNH and bridge the gaps.

## **PROBLEM STATEMENT**

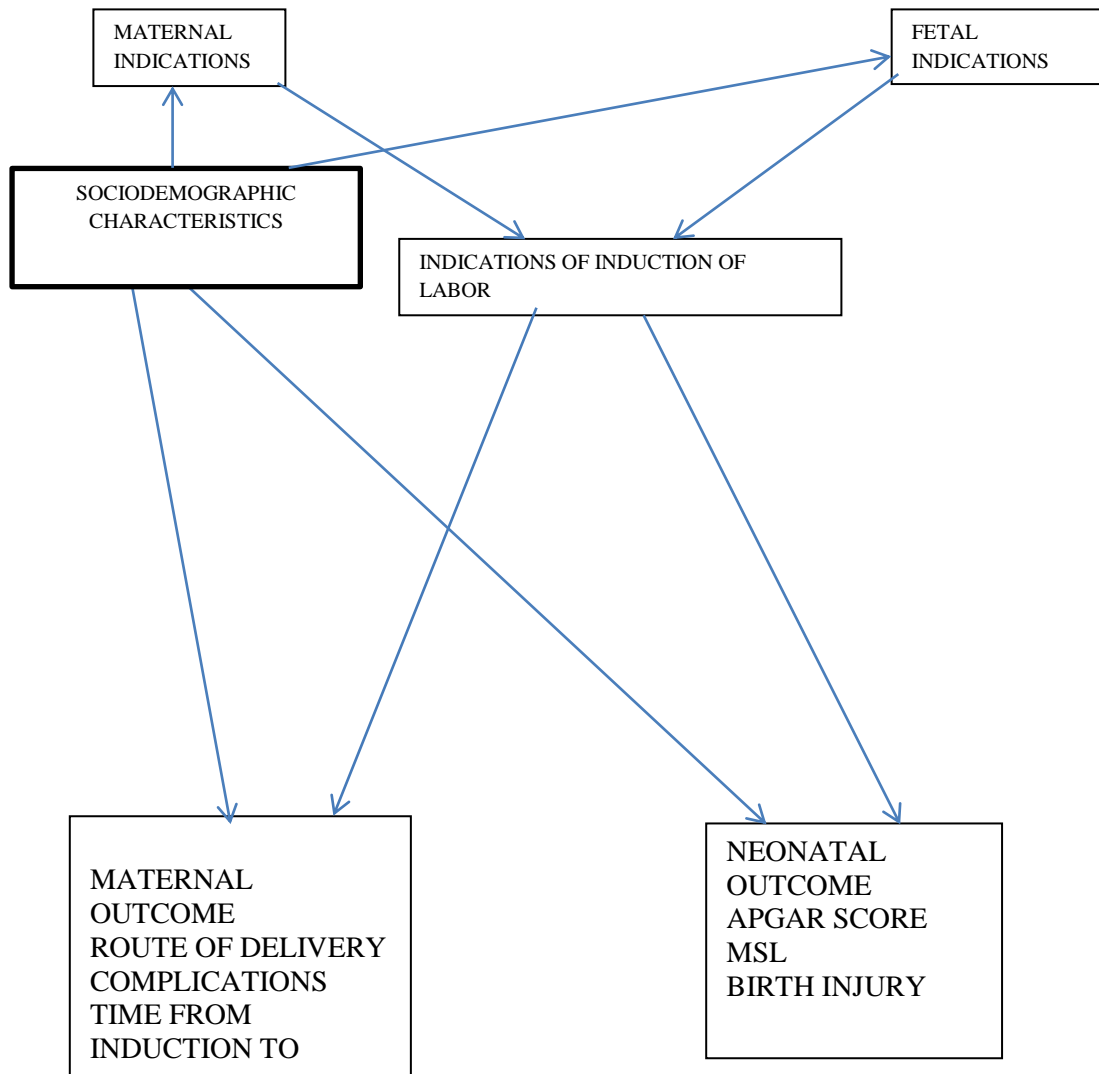
Tanzania is among countries with limited resources, and the increase in rate of Caesarean section is multifactorial , especially in the tertiary referral hospital such as MNH .It has been demonstrated that induction of labour can reduce the caesarean section and perinatal mortality which is high in postdates pregnancies (14). There are several studies done in other parts of the world where the induction rate and maternal and neonatal outcome is known and is on rise but the rate of Induction of labor is yet to be known at Muhimbili National Hospital. The study will help to know how many of the pregnant women undergo IOL and what is the maternal and neonatal outcome of IOL. It is therefore important to do some studies and to show the trend and demonstrate the real gap.

## **RATIONALE OF THE STUDY**

The study sought to show the rate of IOL as it is an important intervention done in daily obstetrics practice and the maternal and neonatal outcome after IOL at MNH. The study sought to demonstrate among others that the procedure is safe, for maternal and neonatal outcome. The results will be disseminated to hospital authorities and departmental specialists and midwives in order to effect necessary changes towards increased utilization of this method of delivery where indicated in efforts to reduce the unacceptably high rate of caesarean section.

## **CONCEPTUAL FRAMEWORK**

Figure 1 on the next page illustrates the conceptual model of the maternal and neonatal outcomes after the induction of labour. In the women with live foetus, the aim of IOL is to accomplish a successful vaginal delivery of the baby with good neonatal outcome. There are maternal and fetal indications for IOL. Women with indication for IOL undergo a pre induction pelvic assessment called as Bishops score which is helpful in determining the optimum time for vaginal delivery or predict successful induction. With a particular method they undergo the induction procedure if they have medical or obstetrics indication. This study sought to review the outcome (such as mode of delivery, maternal complications, neonatal complications, and neonatal admissions to ward for care and management) and the relationship between the outcome variables such as successful and failed induction ,low Apgar score and normal score among pregnant women subjected to IOL on medical or obstetrical indications.



**Figure 1: Conceptual framework**

## **RESEARCH QUESTIONS**

What are the indications, methods and outcomes among pregnant women undergoing Induction of labour at MNH from July 2014 to January 2015 ?

## **OBJECTIVES**

### **Broad objective**

To determine indications, methods, and outcome of induction of labor of women with viable pregnancies at Muhimbili National Hospital.

### **Specific objectives**

- 1 To describe the indications for induction of labour among the pregnant women undergoing induction of labour with live fetuses at MNH.
- 2 To determine the induction to delivery time and methods for the pregnant women undergoing induction of labour with live fetuses at MNH.
- 3 To determine maternal outcomes among the pregnant women with viable fetuses undergoing induction of labour at MNH.
- 4 To determine neonatal outcomes among the pregnant women undergoing induction of labour with live fetuses at MNH.



## **METHODOLOGY**

### **Study design**

This was a descriptive retrospective cross sectional study done among 120 pregnant women who underwent IOL at MNH for a period of seven months from July 2014 to January 2015.

### **Study duration**

The study was conducted for a period of seven months, 1<sup>st</sup> JULY 2014 -20<sup>th</sup> January 2015.

### **Study settings**

The study was conducted in the labour ward at Muhimbili National hospital (MNH), dDar- es -Salaam, Tanzania. It is a tertiary referral and teaching hospital for the Muhimbili University of Health and Allied Sciences (MUHAS). It is the largest referral hospital in Tanzania. It caters for a population of Dar Es' Salaam residents and nearby regions. It receives referrals mainly from three municipal hospitals namely Ilala, Temeke and Mwananyamala and from other parts of the country.

The hospital has five antenatal and post natal wards, in which women who have caesarean section are admitted, including sick postnatal women and those with sick babies. There is one postnatal ward where women without complications who have spontaneous vaginal deliveries with normal babies are kept for 24 hours **on** observation before discharge and one high dependence unit in which patients requiring special care including those with eclampsia or who are unconscious are admitted. There are two

labour wards, one with 20 beds which receives public patients from the wards, home, antenatal clinic, and peripheral hospitals. The other labour ward is for private patients. There are two operation theatres in a building near the labour ward. Muhimbili National Hospital labour ward has a delivery rate (per day) of 32 with an average of about 800 to 900 deliveries a month.

About 70% of all the deliveries taking place at the hospital are admitted from home or from antenatal clinics while 30% are referrals from peripheral hospitals.

The post natal wards have 30 beds. There is also one neonatal ward within the maternity complex where neonates requiring care and further management are admitted such as those with birth asphyxia, prematurity, neonatal sepsis, babies delivered by caesarean section for care are kept in neonatal ward for observation until their mothers are ambulant.

Emergency deliveries through inductions are done in high dependence unit by the resident or registrar on call after consultation with the specialists on duty. The pregnant women scheduled for induction of labour from antenatal clinic are admitted in the antenatal wards a day prior to the procedure. After admission they undergo pelvic assessment and pre induction assessment called Bishops score. The decisions for induction of labour are made by consultants, specialists, residents and registrars do the Bishop score assessments.

The induction procedure with misoprostol 25 mcg is initiated while the women are kept in the antenatal wards and reviewed every four to six hours till maximum of five doses. While induction with dinoprostone, two doses of vaginal dinoprostone 3mg are inserted at 12 hours interval. Once in active phase of labor they are transferred to labor ward for augmentation with amniotomy and i.v Oxytocin if necessary. The Standard Hospital Protocols for IOL at MNH are-

All patients for induction of labor should have a Bishop Score assessment. There must be no evidence of fetal distress. Oxytocin should be used with great caution in

multiparous, after excluding CPD to avoid rupture of the uterus .Do not use oxytocin with parity  $\geq 5$  or previous caesarean section.

Women with uncomplicated pregnancies should usually be recommended IOL between 41 and 42 weeks to avoid the risks of postterm pregnancy. Women with premature rupture (PROM ) at term (at or over 37 week's gestation) should be counseled regarding the risks and benefits of IOL versus expectant management. IOL would generally be recommended within 24 hours of term PROM depending on the staffing levels required for optimal safe administration of oxytocin. Record all findings in the client/patient's case note.

Confirm a normal FHR pattern using Pinard fetoscope / hand held Doppler

Prepare and commence the infusion. Follow the Partogram as recommended for the active phase. Communicate with the Obstetrician/doctor on the progress of labour. Inform the Obstetrician doctor on call of any progress /changes in the client/patient's condition. The study was conducted in the post natal wards after the delivery but before discharge of the women.

### **Study Population**

All obstetric clients delivering at MNH during the study period were enrolled in the study.

### **Inclusion Criteria.**

All pregnant mothers admitted for induction of labor above 28 weeks of gestation.

### **Exclusion Criteria**

Intrauterine fetal death.

Congenital malformation.

### **Sample size estimation**

The sample size was calculated from the formula (16)

$$n = \frac{Z^2 \times p(1-p)}{e^2}$$

Where

n = Desired sample size

Z = Percentage of standard normal distribution corresponding to 95% of confidence interval which is 1.96

e = Margin of error (absolute precision of P which is 7%)

p = Prevalence

Prevalence of cesarean section among the pregnant women undergoing induction of labor in study done in Nigeria was 15%

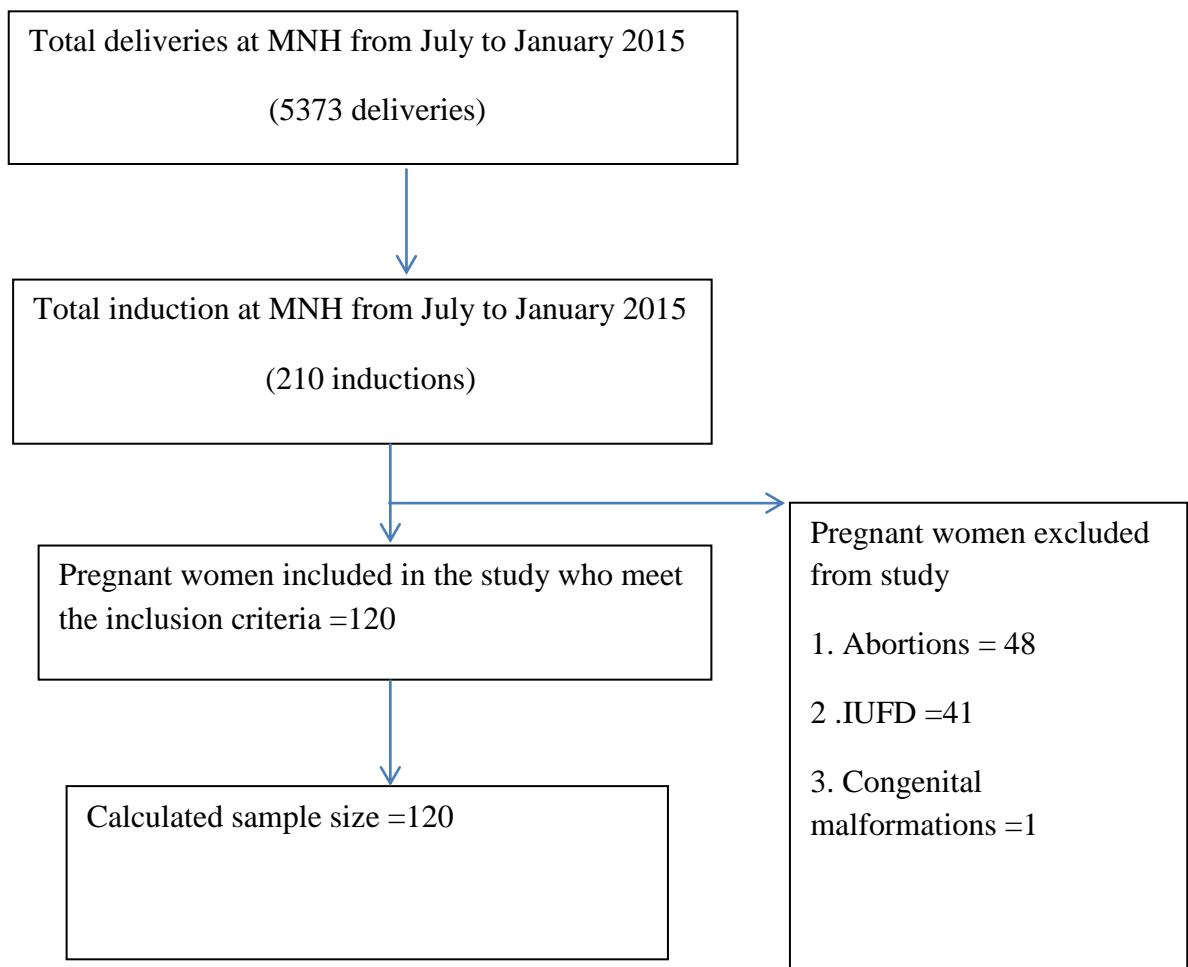
Therefore,  $N = (1.96)^2 \times 15(100-15) / (7\%)^2$

N=100

The minimum size was found to be 100, Plus 20% for the missing data, 120 patients. From the previous records the induction of labor at MNH was 25 to 30 patients per month, so a time period of seven months was sufficient to attain minimum sample size.

### **Sampling method**

The sampling procedure was done by using convenient sampling technique where all the who met inclusion criteria were included. The data was collected for seven months including weekends and public holidays. Those who meet the inclusion criteria were included in the sample.

**FLOW CHART OF DATA COLLECTIONS****Figure 2: Flow chart of data data collection**

**Data collection and research tools**

A structured data collection tool was used, of which Questions 1 to 15, include socio-demographic characteristics such as age, level of education, obstetrics history (which includes gravidity, parity, gestation age).

Questions 16 to question 38 explore the indications of induction of labour; Bishop's score the induction to delivery time, the failure rate of induction of labour and the maternal and neonatal outcome. These were entered in the checklist derived from delivery registers in the labour ward, Antenatal cards, round books and files of the patients.

The Principal investigator ensured correctness and validity of the checklist.

**Pretesting of the checklist**

The checklist was pretested at Muhimbili national hospital. Pretesting was done on fifteen patients and changes were made accordingly to meet the specific objectives.

**Training of research assistants**

Training of research assistants was conducted by principal investigator. One nurse was recruited as research assistant. The research assistant was trained on the purpose of the study the recruitment procedures and how to collect the data using the data collection tool.

**Procedure and Data collection**

Data collection was done all days of the week from eight in the morning before the daily ward round and discharge of patients. The delivery register in the labor ward was checked for the number of deliveries and induction done in the last 24 hours every day.

After delivery the women who had spontaneous delivery were recruited and traced in postnatal ward, and the women who had cesarean section were traced in their respective wards. The mothers who had spontaneous vaginal delivery were discharged after 24 hours and mothers who had cesarean delivery get their babies when they are ambulant and were discharged on the third post-operative day with their babies. The information about the neonates was extracted from the case notes and round books.

The checklist was filled after the delivery of the woman by the research assistant and the Principal investigator in the post natal wards.

The process continued until when the required number of sample was reached.

### **Variables**

#### **Independent variables -**

Socio-demographic characteristics e.g. age, marital status, level of education, occupation.

Obstetric characteristics e.g. parity, gestational age.

Indication for induction

#### **Outcome variables**

The following maternal outcomes were observed:

Mode of delivery a –caesarean section, spontaneous vaginal delivery. Induction to delivery interval, Intra-partum complications .Postpartum complications-pph due to uterine atony, genital tract tears, need for blood transfusion and maternal death.

The following fetal outcomes were observed: Intra-partum- bradycardia or tachycardia .

Meconium-stained liquor, Apgar score less than 7 at 5 minutes ,Admission to neonatal wards Still birth fresh, birth injury, and Neonatal death.

### **Data management**

Every checklist was checked by principal investigator for completeness on the day of data collection. The data collected were coded and entered into computer using Software data SPSS version 20. Data cleaning was done by doing preliminary frequencies to identify missing variables.

### **Data analysis**

SPSS 20 was used to analyze data. Demographic data and categorical variables were summarized into frequencies, means, standard deviations, proportions and cross tabulations. Data was presented in tables and bar charts.

### **Operational Definitions**

Elective induction: Is defined as any induction of labour, which was preplanned in a singleton pregnancy performed before the spontaneous onset of labor in the absence of any fetal or maternal compromise.

Emergency induction: Is defined as induction of labour performed due to medical or obstetrics indication in the presence of any fetal or maternal compromise.

### **Ethical Clearance and Consideration**

Ethical clearance was granted from Muhimbili University of Health and Allied Sciences senate, Research and Publication Committee.

Permission to conduct the study was granted by the Muhimbili national hospital. Patient information was kept confidential at all time. Patient names were not used. All the files, round books, case notes of the neonates were reviewed in the hospital premises in the respective wards.

Information gained on patients' socio-demographic particulars, diagnosis and management was kept confidential and coded. All data were stored by the researcher (Both electronic and hard copies) and under no circumstance was to be released to



unauthorised third party. Information provided was only used for purpose mentioned and consented.

## **RESULTS**

During the study period, there were total of 5373 deliveries, which comprised of caesarean sections including elective and emergency caesarean sections and Spontaneous vaginal delivery.

A total of 120 pregnant women with live fetuses underwent induction of labour and were included in the study of outcome analysis.

**Table 1: Social demographic and obstetrics characteristics of the study population at MNH (n=120).**

| <b>Characteristic</b> | <b>Category</b>        | <b>Frequency</b> | <b>Percent</b> |
|-----------------------|------------------------|------------------|----------------|
| <b>Age</b>            | <20                    | 3                | 2.5            |
|                       | 20-25                  | 30               | 25.0           |
|                       | 26-30                  | 38               | 31.7           |
|                       | 31-35                  | 28               | 23.3           |
|                       | >35                    | 21               | 17.5           |
| <b>Education</b>      | Primary school or less | 35               | 29.2           |
|                       | Secondary school       | 67               | 55.8           |
|                       | College/University     | 18               | 15.0           |
| <b>Marital status</b> | Single                 | 5                | 4.2            |
|                       | Married                | 105              | 87.5           |
|                       | Separated/Divorced     | 10               | 8.3            |
| <b>Occupation</b>     | House wife             | 44               | 36.7           |
|                       | Student                | 3                | 2.5            |
|                       | Petty traders          | 57               | 47.5           |
|                       | Civil servants         | 16               | 13.3           |
| <b>Gravidity</b>      | Primigravida           | 47               | 39.2           |
|                       | Multigravida           | 73               | 60.2           |
| <b>Parity</b>         | 0                      | 56               | 46.6           |
|                       | 1-3                    | 32               | 26.7           |
|                       | 4+                     | 32               | 26.7           |
| <b>Gestation age</b>  |                        |                  |                |

|       |    |      |
|-------|----|------|
| <36   | 11 | 9.2  |
| 36-40 | 49 | 40.8 |
| ≥40   | 60 | 50.0 |

In table 1, The mean age of study participants was 28.72 (SD: 5.47) years. Majority of women were in the age group 26 to 30 (31.7%). The median gestation was 38.76 (28 - 42) weeks. Majority of the clients 73(60.2%) were multigavida, 105 (87.5%) married and 67 (55.8%) attained secondary education.

**Table 2: Frequency distribution showing Indications for Induction of Labour At MNH 2015 (n=120)**

| INDICATIONS                         | FREQUENCY | PERCENT |
|-------------------------------------|-----------|---------|
| Post term                           | 60        | 50      |
| Hypertensive disorders of pregnancy | 36        | 30      |
| PROM                                | 20        | 16.7    |
| IUGR                                | 1         | 0.8     |
| BOH                                 | 3         | 2.5     |

Table 2: The common indications for induction of labour were postterm pregnancy, followed by hypertensive disorders of pregnancy and Premature rupture of membranes.

**Table 3: Frequency distribution showing induction delivery interval at MNH 2015 (n=120)**

| METHOD OF INDUCTION     | Induction delivery interval |            |            | TOTAL |
|-------------------------|-----------------------------|------------|------------|-------|
|                         | <12hrs                      | 12-24 hrs. | >24 hrs.   |       |
| Vaginal misoprostol     | 16 (41.0%)                  | 14 (35.9%) | 9 (23.1%)  | 39    |
| Vaginal dinoprostone    | 21 (33.3%)                  | 28 (44.4%) | 14 (22.2%) | 63    |
| Titrated oxytocin       | 12 (66.7%)                  | 6 (33.3%)  | 0 (0%)     | 18    |
| <b>MODE OF DELIVERY</b> |                             |            |            |       |
| SVD                     | 38 (51.4%)                  | 25 (33.8%) | 11 (14.9%) | 74    |
| CS due to other reason  | 2 (11.7%)                   | 8(47.1%)   | 12 (41.2%) | 17    |
| CS due to failed IOL    | 9(31.1%)                    | 15(51.7%)  | 5(17.2%)   | 29    |

Table 3 shows 16(41.0%) women who received misoprostol delivered in less than 12 hours. Among women who received vaginal dinoprostone 28 (44.4%) delivered between

12 to 24 hours .Among women who received titrated oxytocin 12 (66.7%) delivered in less than 12 hours.Mean induction delivery interval in hours for vaginal misoprostol was 16.72(SD:10.12)hours,vaginal dinoprostone 17.03(SD:11.12) hours and titrated oxytocin was 10(SD:5.16)hours .Half of the women who had emergency caesarean section due to failed induction of labour 15 (51.7%) delivered after 12 hours.

**Table 4: Frequency distribution showing maternal and neonatal outcomes after IOL at MNH, 2015 (n=120)**

| <b>Outcome</b>   | <b>Frequency</b> | <b>Percent</b> |
|--|------------------|----------------|
| <b>Route of delivery</b>                                 |                  |                |
| SVD  | 74               | 61.7           |
| Cesarean sections  | 46               | 38.3           |
| <b>Complications to the mother</b>                       |                  |                |
| PPH  | 3                | 2.5            |
| Retained placenta  | 1                | 0.8            |
| No complications   | 116              | 96.7           |
| <b>Apgar score at 5 minutes</b>                          |                  |                |
| <7   | 1                | 0.8            |
| ≥7   | 119              | 99.2           |
| <b>Meconium Stained liquor</b>                           |                  |                |
| Yes  | 8                | 6.7            |
| No   | 112              | 93.3           |
| <b>Admission to neonatal ward for further management</b> |                  |                |
| Yes  | 10               | 8.3            |
| No   | 110              | 91.7           |

Table 4 shows that majority of the pregnant women 74 (61.7%) had spontaneous vaginal delivery and 46 (38.3%) had emergency caesarean delivery.

All neonates delivered except one had Apgar score more than seven at 5 minutes.8 (6.7%) had Meconium Stained Liquor. While 10 (8.3%) of the neonate delivered were admitted for further management in neonatal ward.

## **DISCUSSION**

A total of 120 pregnant women made up the study group, who had induction of labour at the maternity labour ward over a period of seven months from July 2014 to January 2015. The total number of deliveries during the period of study was 5373, giving rate of 2.3% for all induction. This was low compared to what has been reported in other parts of world especially developed world, where elective inductions on maternal request are done more frequent. There were no cases of elective induction by request in our setting. Indications for induction of labour differ due to patients' and clinicians' desire to arrange a convenient time for delivery. The other reason is due to availability of new cervical ripening agents. The American College of Obstetrician and Gynecologist guideline suggests that labour may be induced for logistic and psychosocial reasons (10).

In our study the common indications for induction of labour was, Postterm pregnancy followed by Hypertensive disorders of pregnancy, pre mature rupture of membranes , Bad obstetric history . Postterm pregnancy was found to be the commonest reason for induction of labour, which accounted for half of the inductions this may be attributed to increased awareness about the risk of stillbirth in postdate pregnancies. This might be also due to practice of inducing women at 41 completed weeks which is consistent with hospital protocols.

Induction of labour is justified to reduce the risk of perinatal mortality in postterm pregnancies due to ageing of placenta (18) .However, proportion of women presenting

as postterm pregnancy may lack accurate determination of gestation which can be attributed to non-availability of early ultrasound scan in first trimester and unsure date of the last menstrual period (13).

A hypertensive disorder of pregnancy was another common indication for induction of labour as it required termination of pregnancy with aim to prevent early perinatal mortality or development of eclampsia. . MNH being the referral hospital with neonatal unit majority of patients with hypertensive disorder of pregnancy and possibility of premature delivery are referred for management and care for a premature care baby.

The results from this study were similar to a study done in Nigeria in 2012 and Kenyatta National Hospital (Marian 2011), where the main indications were postterm pregnancies 51.7% followed by pre mature rupture of membranes in a proportion of 31.7%, the proportion of hypertensive disorders of pregnancy was 10.0 % (16). In contrast the study done by Malende in South Africa in 2014, the main indications for IOL was hypertensive disorders of pregnancy (13) while in the study done by Buloka (12) the main indication for induction of labour was premature rupture of membranes .

The main indication for cesarean section in this study was fetal distress, failed induction, obstructed labour. The term failed induction represents the women who fail to deliver by SVD . The diagnosis of fetal distress was made on irregular fetal heart rate when heard by Pinards fetoscope or by the presence of meconium after the rupture of membranes. There were some cases of obstructed labour which indicates that CDP was not ruled out before IOL.

The mean induction delivery interval among induced patients was  $16 \pm 11.15$  hours. The results were similar closer to the study done by Marian at Kenyatta National Hospital 2011, where, the mean induction to delivery time among induced patients was 19.1 hours (24) .This could be due to similar methods of induction used. A large number of women receiving oxytocin spent less than 12 hours before delivering.

Majority of the SVD occurred in earlier half of Induction delivery interval, while caesarean sections occurred between 12 to 24 hours .There were caesaarean deliveries with increasing duration of Induction delivery interval. This longer interval may have been attributable to delays in drug administration and may result in side effects such as fetal distress. The common method used for induction was vaginal dinoprostone followed by intravenous oxytocin infusion for adequate contractions .We observed that oxytocin infusion was used mainly in women with premature rupture of membranes. We did not compared the methods of induction, their advantages and disadvantages.

The maternal outcome after induction of labour in this study included route of delivery by spontaneous vertex delivery and cesarean section plus the complications faced by the pregnant women.

It was observed that the proportion of pregnant patients who had spontaneous vertex delivery after induction of labor was 61.7% and proportion of women who underwent cesarean section was 38.3%. Similar observations were noted in the study done by Malende (13) at regional hospital in rural Kawazulu Natal Province, South Africa, where 59.8% of women had spontaneous vaginal delivery, and 40.2 % had caesarean section. This can be due to urban setting of both the studies.

This is contrary to the study done in Nigeria where, the overall proportion of spontaneous vaginal delivery was higher 85 % (16).The reason for the difference could be due to higher induction rate and due to careful patient assessment before induction.

It was observed that there were no serious maternal complications such as third or fourth degree perineal tear, maternal death or uterine rupture. This could be due to proper monitoring of women throughout the labour. The immediate maternal complication observed were , post-partum hemorrhage and retained placenta. There was no case of puerperal sepsis. There was no follow up after 24 hours of delivery. This observation was similar to the study done by Malende (13) in South Africa where 2% of the women had postpartum hemorrhage, 0.6% had puerperal sepsis. In contrast to the study done in Nigeria , most common maternal complications were hyper stimulation of the



uterus (6.7%), followed by primary post-partum hemorrhage due to uterine atony 5.0% and perineal tear 5.0 (16). The occurrence of uterine hyperstimulation, which is a known complication of vaginal misoprostol was present in the study from Nigeria, it may be also due to differences in the dosage used and better intrapartum monitoring

It was observed that the neonatal outcomes were good where, 99.2% of the neonates were born with Apgar score more than 7 at five minutes and 6.7% of the neonates had meconium stained liquor. However, a total of 8.3% neonates required admission to neonatal ward for further care and management. Six neonates were premature and four had neonatal sepsis, they were on intravenous antibiotics, and admitted in neonatal ward. Their mothers were stable. Prematurity was secondary to induction in hypertensive disorders which is an emergency requiring immediate delivery of baby irrespective of gestational age. There was no fresh still birth. There was no neonate born with congenital malformations.

The results are similar to study done by Malende in South Africa, where the total of 6.8% of babies were admitted to neonatal wards out of which 2.0% were premature, 1.85% had hypoxic ischemic encephalopathy (13). This similarity can be due to the reason that both the studies sites were the referral hospitals. In contrast to study done in Nigeria, the proportion of neonatal admission to special care baby unit for further management was 11.7%, which was higher than in this study (16). This difference could be due to the smaller sample size compared to our study.

### **LIMITATIONS OF THE STUDY**

The investigator depended on the accuracy of the medical records as the outcomes had already occurred before. The information sometimes was difficult to collect due to missing data in the files. The accuracy of gestation age was based on the last normal menstrual period.

### **CONCLUSIONS**

The rate of induction of labor in our setting is low. Postterm pregnancy accounted for the majority of indications for induction of labor at term at Muhimbili National Hospital.

Pharmacological method was the common method used for induction of labour. The maternal and neonatal outcomes were good.

## RECOMMENDATIONS

Further studies should be done to compare the best method of induction of labour.

To encourage more induction of labour together with vigilant monitoring of women during the process of induction and during labour, including a cardiotocograph.

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**CHECKLIST****Assistant Name:** \_\_\_\_\_ .

Date.....Hospital REG number..... Study No.....

1. Age .....Years
2. Weight .....Kilogram
3. Height.....Cm
4. Systolic blood pressure.....mm HgSBP
5. Diastolic blood pressure .....mmHgDBP
6. Any disease diagnosed .....|.....
7. Gravida.....
8. Parity: .....
9. Number ..... of ..... living  
children:.....
10. Abortion.....  
.....
11. Gestation  
age.....
12. History of 1)Alcohol use 2) Smokers
13. Education  
1) None 2) Primary 3) Secondary 4) University level 5) Others

14. Marital status:

- 1) Married 2) Separated 3) Co-habiting 4) Widow

15. Occupation:

- 1) Farmer 2) House wife 3) Petty trader 4) Civil servant 5) Student

16. Indication for Induction of Labor: 1) IUGR 2) Postdate 3) PROM

- 4) IUDF 5) Pre eclampsia 6) Eclampsia 7) Others.....

17. BISHOP SCORE: (1) 7 and more than 7 (2) less than 7

18. Induction Methods:

- 1) Vaginal Misoprostol .....  
 2) Dinoprostone.....  
 3) Amniotomy + Titrated Oxytocin: .....  
 4) Titrated Oxytocin :.....  
 5) Trans cervical balloon catheter.....

19. Misoprostol(25mcgs) :

- 1) 1<sup>st</sup> Dose time:.....time interval(.....hours)  
 2) 2<sup>nd</sup> Dose time:..... time interval(.....hours)  
 3) 3<sup>rd</sup> Dose time:..... time interval(.....hours)  
 4) 4<sup>th</sup> Dose time:..... time interval(.....hours)  
 5) 5<sup>th</sup> Dose time:..... time interval(.....hours)

20. Dinoprostone:

- 1) 1st Dose time:.....time interval(.....hours)  
 2) 2nd Dose time:..... time interval(.....hours)  
 3) 3rd Dose time:..... time interval(.....hours)

21. Oxytocin used for induction .....units.

22. Induction time stat :.....Hrs

23. Total Oxytocin used from induction till delivery ..... units.
24. Time interval, time of induction of labour to onset of contractions:.....Hrs
25. Decision time for Caesarean section .....Hrs
26. Time interval from induction of labor till time of delivery of baby.....Hrs.
27. Route of Delivery: 1) SVD 2) Instrumental SVD( episiotomy) 3) Emergency C/S
28. Delivery time for baby of SVD:.....
29. Delivery time for baby of Caesarean Section. :.....Time interval (.....)Hrs
30. Apgar score at 1 min:.....
31. Apgar score at 5 min.:.....
32. Indication for caesarean section :1) Failed induction of labour 2) Fetal Distress  
3) Obstructed labor.....4) Others .....
33. Maternal complications:1) PPH 2) Perineal Tear 3) Retained Placenta  
4) Hyper stimulation 6) Others.
34. Estimated Blood Loss.....mls
35. Blood transfusion received (within 72 hours): 1) Yes 2) No
36. Fetal complications:  
1) Low Apgar score less than 7 after 5 min. 2) Birth injuries 3) Fresh still birth  
4)Meconeum stained liquor 5) Others
37. Admission to neonatal Ward for care 1)Yes 2) No
38. Admission to neonatal Ward / (I.C.U) for further management.1) Yes 2) No.